TECHNICAL SPECIFICATIONS

PORTABLE ELECTRONIC REFERENCE STANDARD METER OF ACCURACY CLASS 0.2S FOR TESTING OF ALL TYPES SINGLE PHASE ENERGY METERS.

a. SCOPE:

The specification covers the requirement of design, manufacturing & delivery of electronic reference standard meter (RSM) duly calibrated/ tested from any NABL accredited laboratory/any internationally recognized laboratory with accessories suitable for testing of all types of single-phase energy meters.

b. APPLICATION:

The function of the RSM shall be suitable to measure the system parameters and verify the accuracy of the single-phase energy meters in the laboratory and at site both direct mode and without disconnecting consumers supply when used with the clamp-on CT.

c. SYSTEM TECHNICAL DATA:

The RSM shall be suitable to test energy meters under the following conditions.

- Voltage : 240V (-30% & +20%)
- Frequency : 50 Hz ± 5 %
- Power Factor : zero Lag - unity - zero Lead
- Current Range (Imin–Imax) :1) Direct Mode - 50mA to 10A
  2) Clamp on CT Mode - 50mA to 60A
- Accuracy Class : 0.2s

d. SERVICE (CLIMATIC) CONDITIONS:

The equipment to be supplied against this specification should be capable of performing and maintaining the required accuracy for satisfactory operation under all tropical conditions mentioned below:

- Maximum ambient temperature : 50 Deg.C
- Minimum ambient temperature : 0 Deg.C
- Maximum ambient air temperature in shade: 45 Deg.C
- Average daily ambient temperature : 42 Deg.C
- Minimum relative humidity : 25 %
- Maximum relative humidity : 90%
- Annual average ambient temperature : 40 Deg.C

e. STANDARDS APPLICABLE:

Unless otherwise specified elsewhere in this specification, the

RSM shall confirm in all respects including performance and testing thereof to the following Indian/ International Standards to be read with up to date and latest amendments/ revision thereof:

IEC687	Alternating current static watt-hour meters for Active Energy
IEC736/1982 with latest amendments	Testing equipment for Electrical Energy Meters
IEC62052-11:2003	Electricity metering equipment (AC)-General requirements, test and test conditions-part-11-Metering equipment
IEC61000-4-5	Electromagnetic compatibility, testing and measurement techniques, surge immunity test.
IS:9000 with latest amendments	Basic Environmental Testing procedures for Electronic and Electrical items
IEC60687-2000 with latest amendments	AC Static watt-hour meters for active energy, calss-0.2s
IEC62053-21	Electricity Metering equipment (AC)-Particular requirements-part-21 static meters for active energy, class 0.5
IS:11426 with latest amendments	Alternating current precision watt-hour meter of class 0.5 for testing purposes
IS:12346	Testing equipment for AC Electrical Energy Meters
IS:13010/2002	AC watt-hour meters, calss-0.5, 1 and 2
IS:13779/1999	Specification for Energy meter of class 1 and class 2- Specification
IS:14697/1999	AC Static Transformer operated watt-hour and VAR-hour meters, class 0.2S – specification
IS:15707/ 2006	Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters- Code of Practice
IS:15884/ 2010	Connected Static Prepayment Meters for Active Energy (Class 1 and 2) - Code of Practice
IS:15959	Specification for Alternating Current Direct. Data Exchange of Electricity Meters

IS:16444 (Part 1&2)	Specification for Alternating Current Direct Connected Smart Meters for Active Energy (Class 1 and 2) & Class-0.5s /0.2s for CT Operated - Code of Practice

f. GENERAL REQUIREMENTS:

I. All the materials, electronic and power components ICs used in the manufacturing of the reference standard meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.

II. The electronic components shall be mounted on the PCB using latest surface mount technology (SMT).

III. The RSM shall be of rugged construction, lightweight and shall be of portable, handy and compact type. It shall have ergonomic design.

IV. The RSM shall be suitable for laboratory and field testing of all types of single phase energy meters of accuracy class 1 and 2 as per relevant standard.

V. Clamp-on CT along with a suitable connecting cable and a set of voltage leads with injection type crocodile clips which enable the testing without isolating or interrupting the supply of the consumer shall be supplied along with the RSM. Adequate built in features to protect the instrument itself from over-voltage shall be provided.

VI. An error calculator shall be incorporated in the RSM which shall have facility to calculate error in percentage of meter under test by feeding the meter constant and number of revolutions / pulses for which meter was tested with RSM, through the inbuilt keyboard.

VII. The equipment shall have provision for input of data such as a key-pad. It should be in the front of the equipment. The key pad shall have facility to enter alpha- numeric characters.

VIII. The ERS meter shall be type tested for IP 51 degree of protection as per IS: 12063 against ingress of dust & moisture.

IX. The ERS should have self-check for proper connection. It shows discrepancy by warning message or actual values or vector diagram.

g. **STANDARD RATED CURRENT AND MAXIMUM CURRENT**:

The Standard current rating of the RSM shall be,

1) Direct Mode - 50mA to 10A
2) Clamp on CT Mode - 50mA to 60A.

h. MEASUREMENT MODES:

The offered equipment should have one number Clamp-On type current transformer (CT) with connecting cable of suitable length. The CT shall be suitable to measure more than current up to 60 Amp and suitable for use with cables of overall diameter not more than 10-12 mm.

The equipment shall have facility to interchange the clamp on CT without affecting the accuracy.

The CT shall not saturate up to 150% of the highest rated current i.e. if 150% of highest rated current is applied for 30 minutes, the RSM shall not get damaged and after restoration of normal conditions, it should continue to measure correctly within the respective accuracy class.

i. ACCURACY REQUIREMENT:

The accuracy of RSM shall be Class 0.2s with Clamp on CT for the current range of 50mA to 60A.It shall be suitable for operation within its accuracy as per the standards.

For the accuracy certification of test equipment, high frequency pulse output shall be provided on it.

j. OPERATING MODE:

Manual mode: The equipment shall have facility to test in manual mode using snap switch. Snap switch along with detachable lead to start and stop the test shall be supplied along with the RSM. It should be possible to test meter from key board also in absence of snap switch.

Auto mode: A compatible common scanner shall be provided along with the equipment to test electromechanical meters by sensing the rotor mark and static (electronic) meters by sensing the LED pulses. The scanner (sensor) should be strong enough to sense the meter LED output pulse from a minimum distance of 30mm. i.e. it should be capable to catch the pulses from outside the cover of clean transparent polycarbonate meter box at site.

k. DISPLAY:

The measured value shall be displayed on Minimum 3 inch LCD or better display. The equipment shall have facility to display following parameters.

a. Instantaneous Voltage xxx. xx Volt
b. Instantaneous Current xx. xxx Amp
c. Instantaneous Power Factor x.xxx
d. Energy Measurement xxx. xxx wh
e. Energy Measurement xxx. xxx VARh
f. Frequency xx. xx Hz
g. Instantaneous load xxx. xxx kW
h. Percentage error xx. xx%

l. CONNECTION CHECK:

The equipment shall have auto connection check facilities for following:

a. Reverse current.
b. Missing current.
c. Over voltage
d. Low voltage
e. Over range for current circuit

m. OPERATOR DATA ENTRY:

The RSM shall have facility to input/enter following information:

Sl No	Data entry parameter	Resolution /No.	Type
1	MUT Serial No.	20	Alphanumeric
2	Consumer ID	20	Alphanumeric
3	Consumer RR NO	20	Alphanumeric
4	Meter Type	10	Alphanumeric
5	Meter make	10	Alphanumeric
6	Meter Constant MUT	7	Numeric
7	Test revolutions/Pulses per Kwh	5	Numeric

n. DATA STORAGE:

The equipment shall have non-volatile memory (NVM). The NVM shall have a facility to store minimum 12000 test results. The following parameters should be logged along with the test results and to be displayed by reading software.

a. Make & Serial number of RSM
b. Make of MUT
c. Serial Number of MUT
d. Consumer identification
e. Meter constant of MUT
f. No. of revolution / pulses for which test is being carried out
g. Instantaneous Voltage

h. Instantaneous Current
i. Frequency
j. Instantaneous Power factor
k. Energy logged by reference meter
l. Test duration, test time &date
m. PF
n. Error in percentage
o. %THD of Voltage & current Harmonics

The NVM shall store 12000 results on first-in, first-out basis. It shall be possible to download the stored data to a PC using the supplied communication cord with RS232 connector (at computer end). If the RSM results are not downloaded to a PC and the memory becomes full, the oldest (first) result shall not be automatically get overwritten by the new result, then the second and so on. The RSM should provide suitable warning message before overwriting and once memory is full.

o. SAFETY REQUIREMENTS:

The RSM shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal working conditions, so as to ensure especially;

- Personal safety against electric shock
- Personnel safety against effects of excessive temperature
- Safety against spread of fire

All parts, which are subject to corrosion, shall be suitably protected and shall not be liable to damage by normal handling. All cables and connectors should be supplied.

p. CASE AND WINDOW:

The RSM shall have an insulated case and any non-permanent deformation of the case shall not affect the satisfactory performance of the equipment. The window shall be made of transparent material.

q. POWER CONSUMPTION:

The power consumption of the RSM at a reference voltage, frequency, temperature and rated current shall not be more than 2 VA in current circuit excluding clamp on CT & 10 VA in voltage circuit excluding the leads.

r. CARRYING CASE:

Each RSM shall be supplied with a carrying case suitable for easy portability, rugged use and to prevent damage during transit.

s. MARKING ON RSM:

The RSM shall have a name plate. The marking on the name-plate shall be indelible, distinct and easily readable. The basic markings on the RSM name-plate shall be as follows:-

- Name of Manufacturer, address, contact details, E-mail ID of authorized service provider
- Designation of type
- Serial number
- Current range
- Reference voltage
- Accuracy Class
- Property of "BESCOM"
- Purchase order no. & date
- Guarantee Period
- Reference frequency.
- Month & Year of manufacture

Terminals & marking: One terminal shall be provided on the RSM to connect communication cord or snap switch or scanner or printer.

t. SOFTWARE:

Each RSM shall be supplied along with PC Software. The software shall be suitable for downloading the test results into PC having latest windows operating system using RS 232/ Wi-Fi/ Bluetooth/ USB port. The software shall have facility to generate the test report for individual testing and summary report of all test reports.

The offered software shall have facility to convert all stored test results in ASCII file format. The offered software shall be user friendly & menu driven. The Supplier shall impart necessary training regarding installation and use of the above software.

Suitable software shall be provided by manufacturer to download all the Meter data stored in ERS to PC/ laptop using RS-232 or USB at free of cost.

u. ACCESSORIES

Each RSM shall be supplied along with following accessories:

- Common optical sensor for automatic testing, which can be used to sense disc revolutions in electromechanical meters as well as calibration pulse output LED"s of static meters from a minimum distance of 30mm i.e. it should be capable to sense the LED from the outside of the front cover of clean

transparent polycarbonate meter box.

- Mounting arrangement (clamp) for the optical sensor.
- Clamp on CT for online testing along with a spare.
- A set of voltage leads with insulated clips.
- Cable to power up the equipment in the office.
- USB /Serial communication cord with RS232 connector to retrieve stored data from the RSM and download the same to a PC.
- Snap switch along with detachable lead.
- Windows based Base Computer Software (BCS).
- Portable printer along with charger.

v. TESTING AND CALIBRATION:

Each RSM shall be supplied duly tested /calibrated from any NABL accredited /any internationally recognized laboratory. Certificate of such lab should be supplied with each RSM.

w. GUARANTEE

The RSM should be guaranteed for performance for a minimum period of 66 months from the date of receipt in stores. The equipment found defective within the above guarantee period shall be replaced with the new RSM duly tested/calibrated from any NABL accredited/any internationally recognized laboratory by the supplier free of cost within one month of receipt of intimation.

The bidder should provide a standby ERS till the faulty ERS get repaired and returned. After the replacement / repairs / rectification, the accuracy shall not be affected. Test report and calibration certificate shall invariably be submitted after rectification / repairs. If defective ERS is not replaced / repaired / rectified within the specified period as above, the Company shall recover an equivalent amount.

x. TEST AND FACILITIES:

The bidder shall provide at his cost, facilities to carry out the following tests at the time of inspection of this equipment at the manufacturer premises as per sampling plan of relevant IS:-

1 Test of Influence Quantities
2 Test of limits of error
3 Test of meter constant
4 Test for starting condition
5 Test of no load condition
6 Test of repeatability of error
7 Test for power consumption

y. TESTS:

1. **<u>Type Tests:</u>**

   The Electronic Reference Standard Meter should be type tested at any of the test laboratories by the bidder as per relevant standards and this technical specification. The bidder shall furnish following type test reports along with the bid.

   a) Test of insulation properties.
   b) Test of Accuracy requirements.
   c) Repeatability of error test.
   d) Test of influence quantities
   e) Test of operation of optical scanner
   f) Test of power consumption

2. **<u>Acceptance tests:</u>**

   All acceptance tests as stipulated in the relevant standards and in this specification shall be carried out by the Supplier.

3. **<u>Routine Tests:</u>**

   All routine tests as stipulated in the relevant standards shall be carried out and routine test-certificates/reports shall be submitted to the BESCOM for approval.

z. AFTER SALES SERVICE:

The bidder has to indicate clearly the after sales service to be provided by the supplier within guarantee period and outside guarantee period and Addresses of Sales Service Centre, details of Engineers, etc. shall be submitted along with the offer.

aa. DOCUMENTATION:

Two sets of following documents shall be supplied along with each test system.

- Operating manual
- Service manual
- Calibration certificate of reference standard meter.

bb. TRAINING

The successful bidder shall depute their representative to educate Engineers of purchaser as and when they will be called for at no extra cost.